3 67

40.02

21

WATER QUALITY

Water quality in the Potter Creek area has not been thoroughly studied, and available data on water quality are sparse. This is especially true with regard to ground water. Nevertheless, some data have been collected, and some preliminary

• The quality of surface water in the Potter Creek area is very good, based on the limited information now available; it is suitable for recreational use. • Ground-water quality in the Potter Creek area, again, based on limited avail-

able data, is good; it is generally suitable for use as a domestic water

• Water from some wells may benefit from treatment to reduce iron and mang-

Although water quality in the Potter Creek area is now good, the quality could be degraded if future development is improperly undertaken. Steps taken in planning and carrying out road and home construction in the area can help maintain the presently high quality of water resources in the Potter Creek area. Use of setbacks and greenbelts in critical areas might be one way to reduce the impact of development on surface water. Subdivision plans that minimize the number of places streams are crossed by roads can also protect water quality. Where roads do cross streams, use of bridges instead of culverts buried in unstable embankments could reduce sediment loads contributed to streams. In addition, the density, design, installation, and maintenance of domestic waste-disposal systems, as well as of sewer lines, can have an important effect on both ground- and surface-water quality.

Ground Water

The locations of four domestic-supply wells, each of which was sampled once to determine the quality of water, are shown in figure 12. The results of these water-quality analyses are shown in table 2.

The predominant ions in ground water in the Potter Creek area are calcium and bicarbonate. The water sampled was moderately hard (84-100 milligrams per liter [mg/L] as CaCO₃); however, water samples from five nearby wells in similar geologic settings had hardness values exceeding 120 mg/L as CaCO, (Dearborn and Barnwell, 1975). When hardness as CaCO, is 100 mg/L or more, water softening units may be desired to produce water more suitable for domestic use (Hem, 1970).

Iron concentrations in water from the four wells are less than the recommended maximum of 300 micrograms per liter (µg/L) for drinking water set by the U.S. Environmental Protection Agency (1976). Values as high as 3,100 µg/L were reported for wells in similar geologic materials elsewhere in the Hillside area (Dearborn and Barnwell, 1975).

Manganese concentration slightly exceeds the recommended limit of 50 µg/L (U.S. Environmental Protection Agency, 1976) in water from one of the four wells sampled. Both iron and manganese concentrations can be reduced to acceptable levels by water treatment units designed for use with domestic water supplies.

The concentrations of all other constituents analyzed are within recommended limits, and they appear to be typical of ground-water quality throughout the Hill-

Surface Water

Surface-water quality data were collected in October 1979 and March 1980 at four sites on Little Rabbit Creek and two sites on Potter Creek; streamflow measurements were also made at those times at a third Potter Creek site. (See figure 2 for locations.) These data are presented in table 3. Miscellaneous water-quality and streamflow data (table 4) were collected on Little Rabbit Creek from July 1961 through April 1973 at a site just above the Old Seward Highway A recording streamgage was operated on Little Rabbit Creek about 300 ft below the Old Seward Highway from May 1979 until September 1980. At the streamgage site, field data for as many as seven water-quality characteristics were collected on 15 occasions from June 1979 through June 1980 (table 5). In September 1980, the recording streamgage was relocated about 1.8 mi upstream to a more stable reach of Little Rabbit Creek. The gage is still (December 1981) in operation at that

Except for some of the data in table 5, the available water-quality data for the Potter Creek study area represent stream water quality under low streamflow conditions when ground-water contribution is a significant portion of the flow. During periods of higher flow when surface runoff dilutes ground-water inflow, dissolved chemical constituents generally occur in lower concentrations while constituents associated with suspended materials generally occur in higher concen-

All available water-quality data from the Potter Creek study area show that the predominant ions in the surface water are calcium and bicarbonate and that the water is of uniformly high quality. Hardness is less than that of the area's ground water and ranges from 44 to 83 mg/L as CaCO2. These concentrations indicate soft to moderately hard water suitable for most domestic purposes (Hem 1970). Concentrations of all other chemical constituents were well within normal ranges and recommended limits for drinking water (U.S. Environmental Protection Agency, 1976) when sampled. Stream waters were well oxygenated, having dissolved-oxygen concentrations at or near saturation. Stream temperatures ranged from 0°C in the winter to about 10°C in summer.

Ten of 15 fecal coliform samples showed very low numbers of organisms (2 to 11 colonies per 100 ml of sample); the other five samples developed no colonies (reported as less than 1 colony per 100 ml). Thus, the streams met State of Alaska standards for Class A (drinking) waters at the times they were sampled. During periods of high flow, when overland runoff contributes most of the streamflow as well as significant suspended material, the fecal coliform levels may be significantly higher.

In future investigations in the Potter Creek area, it may be preferable to measure fewer water-quality characteristics and to estimate others, if reliable estimates can be made. To examine this possibility, statistical methods were used to study the relationships among the water-quality characteristics measured in the Potter Creek area. Certain characteristics studied appear to be closely correlated with others, so that the value of one may be used to reliably estimate the value of another. In order to test such correlations, linear regression analysis was used

In linear regression analysis, a linear equation is proposed for estimating the value of an "unknown" dependent variable, given the known value of an independent variable. The proposed equation is tested by comparing the values it "predicts" with those observed. A "coefficient of determination" is computed which is a measure of the agreement between predicted and observed values, or the correlation. The coefficient of determination ranges from 0 to 1, with 1 representing a perfect correlation. The standard error of estimate may also be computed; this is he value or magnitude, in whatever units used, of one standard deviation from the value estimated by the correlation equations. For more detailed discussion of regression analysis and standard error of estimate, see Hardyck and Petrinovich

Data sets from analyses of 17 surface-water samples, (tables 3 and 4) were subjected to linear regression analysis to define correlations among selected chemical constituents. All samples represent surface water under low-flow conditions. Six chemical characteristics yielded coefficients of determination of 0.50 or more when tested for correlation with field-measured specific conductance. Table 6 presents the results of this statistical analysis; the equations correlating the variables are given, along with their coefficients of determinination and standard

Two chemically related water-quality characteristics, hardness and bicarbonate ion concentration, show especially good correlation with field-measured specific conductance: their coefficients of determination are 0.95 and 0.96 respectively. Figure 13 is a graph of specific conductance versus hardness; also plotted is the linear equation correlating the two variables. Owing to the good correlation between specific conductance and hardness, a reliable estimate of hardness of surface water in the Potter Creek area under low-flow conditions can be based on a simple specific conductance measurement. Comprehensive collection in area creeks of water-quality data throughout the range of flows observed would be needed to determine chemical and physical relationships under conditions of other

A more comprehensive set of water-quality data is available for the streamgage site near the mouth of Little Rabbit Creek (table 5). Statistical analysis of these data shows significant correlation between streamflow and specific conductance, and between streamflow and alkalinity; coefficients of determination are 0.72 and 0.92 respectively. Figure 14 is a graph of both specific conductance and

The correlation equations show that both specific conductance and alkalinity decrease as streamflow increases. Specific conductance and alkalinity reflect the concentration of dissolved solids in the stream water, and when streamflow is high. overland runoff dilutes the more mineralized ground-water inflow.

Table 2. -- Water-quality data from four ground-water samples from wells in Potter Creek and Little Rabbit Creek basins [Sites shown in figure 12. Results in milligrams per liter except as indicated.]

				'			Dissolved constituents																				
Section, map number, and aquifer lithology*	Date of sample	Time	Temper- ature (°C)	Specific con- ductance (µmhos)	pH {units)	Carbon dioxide (CO ₂)	Alka- linity (CaCO ₃)	Bicar- bonate (HCO ₃)			Hardness (CaCO ₃)		Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potas- sium (K)	Chloride (Cl)	Sulfate (SO ₄)	Fluoride (F)		Arsenic (µg/L) (As)			Iron (µg/L) (Fe)	Manganese (µg/L) (Mn)		Solids sum of consti- tuents
11 9 U 3 7 B	04/29/80 04/03/80 04/03/80	1800 1330 1200	3.5 5.0 5.5	193 205 180 231	7.3 6.8 6.4	7.3 25 54	75 82 70 83	100 100 85 91	0.05 0.81 1.3 2.5	0.02 0.01 0.01 0.00	85 100 84 100	10 18 15 20	26 32 27 35	4.8 4.8 4.1 3.8	3.7 3.3 3.3 2.4	0.3 0.3 0.5 0.0	0.5 1.4 2.5 1.2	15 16 16 14	0.1 0.1 0.0 0.1	11 12 12 11	1 0 1 1	0 33 110 50	0 0 1 0	80 <10 20 <10	70 < 1 < 1 5	119 126 118 134	107 123 113 129

Table 3. -- Water-quality and streamflow data from surface-water sites in Potter Creek and Little Rabbit Creek basins under low

								Co11		Sed1-	ļ	· · · · · · · · · · · · · · · · · · ·		Dissolve	d_consti	tuents				
Site number and name	Date	Time	Stream flow, instan- taneous (ft ³ /s)	ature	Spe- cific con- duct- ance (umhos)	pH (units)	Colo (pla inum coba unit	t- 0.7 - UM-1 1t (cols	Sedi- F ment	sus- pended	0xyger	Oxygen (per cent satur- ation)	Carbon dioxide (CO ₂)	Alkalinit (CaCO ₃)	Bicar- ybonate (HCO ₃)	Nitro- gen (N)	Nitro- gen, organic (N)	Nitro- gen, ammonia (N)	Nitro- gen, am- monia + organic (N)	Nitro- gen, NO ₂ +NO (N)
. Potter Creek (upper)	10/24/79 03/25/80	1300 1130	1.3 0.52	1.0 0.5	120 125	7.3 6.9	5 5	*K4	2	0.01	13.3 13.7	100 100	3.9 11	39 43	48 53	1.4 1.4	0.56 0.38	0.01 0.02	0.57 0.40	0.79 1.0
2. Potter Creek at Potter Ravine	10/79 03/80	1530 1500	1.5 0.71							==						\ 				
3. Potter Creek at Potter	10/24/79 03/25/80	1430 1400	2.2 0.78	1.5 1.0	140 160	7.3 7.3	5 5	*K4 1	2	0.01	13.7 14.1	100 100	4.9 6.2	50 63	61 77	1.8 1.9	0.67 0.49	0.00 0.02	0.67 0.51	1.1 1.4
 Little Rabbit Creek at Nickleen Drive 	10/25/79 03/26/80	1045 1045	2.3 1.0	2.0 0.5	100 135	6.7 7.1	5 5	*K5	1	0.01	13.0 13.6	99 99	13 7.5	34 48	41 59	1.0 1.1	0.56 0.51	0.01 0.02	0.57 0.53	0.45 0.59
Little Rabbit Creek tributary	10/25/79 03/26/80	1130 1545	0.77 0.17	2.0 0.0	150 165	6.8 7.5	5 5	*K2	3	0.01	13.2	101 99	18 4.0	59 65	72 79	1.9 2.0	0.94 1.0	0.02 0.06	0.96 1.1	0.97 0.90
6. Little Rabbit Creek at Goldenview Drive	10/25/79 03/26/80	1245 1215	3.4	2.0 0.5	123 150	6.9 7.2	0 5	*K4 1	2	0.02	13.5	102 100	7.0	44 57	54 69	1.2 1.0	0.62 0.35	0.00 0.02	0.62 0.37	0.54 0.63
 Little Rabbit Creek near Old Seward Highway 	10/25/79 03/26/80	1430 1500	3.9	2.5 0.5	130 155	6.8 7.5	30	*K2 *K2	2	0.02	13.2	100	15 3.5	48 57	59 70	1.4 0.98	0.79 0.29	0.01 0.04	0.80 0.33	0.58 0.65
	[Diss	lved cons	ti tuent	·								
Site number and name	Date	Time	Phos- phorus (P)	Hard- ness (CaCO ₃)	Hardness noncar- bonate (CaCO ₃)	Calcium			as- Chlo- um ride (Cl)			Silica (SiO ₂)	Iron	Manga- nese µg/L) (Mn)	Arsenic (µg/L) (As)	Lead (µg/L) (Pb)	Solids, residue (180 °C	const	: ' -	
1. Potter Creek (upper)	10/24/79 03/25/80	1300 1130		52 60	13 16	17 19	2.4	1.5 2.1		19 15	0.0	8.0 10	30 20	1	2 1	0	81 78	76 80		
 Potter Creek at Potter Ravine 							==						==							
3. Potter Creek at Potter	10/24/79 03/25/80	1430 1400		66 82	16 19		4.2	2.1 0 3.4 0	4 0.8	17	0.1 0.1	8.9 11	20 10	1	1	0	74 99	88 103		
4. Little Rabbit Creek at Nickleen Drive	10/25/79 03/26/80	1045 1045	0.01 0.01	44 64	11 16		3.4	1.6 0 2.6 0	3 0.8	14 15	0.0 0.1	8.0 10	20 10	2	1	0	47 69	63 84		
5. Little Rabbit Creek tributary	10/25/79 03/26/80	1130 1545		67 83	8 19			1.9 0 2.4 0	3 2.6	15 13	0.0	8.6 10	30 30	10 6	1	0	85 96	91 101		
5. Little Rabbit Creek at Goldenview Drive	10/25/79	1245 1215	0.00 0.01	52 72	8 15	16 22	2.9	1.9 0 2.8 0		15	0.0	8.7	40 20	4	2 1	0	83 90	75 92		
do i de il i i i i i	, ,													-			1			

*K - non-ideal colony count

Table 4.-- Water-quality data for Little Rabbit Creek at Anchorage (near Old Seward Highway) from 1961-1973 [Site 7 shown in fig-

Date	Time	Stream- flow, instan- taneous (ft³/s)	Temper- ature (°C)	Specific con- ductance (µmhos)	pH (units)	Carbon dioxide dis- solved (CO ₂)	Alka- linity (CaCO ₃)	Bicar- bonate (HCO ₃)	cobalt	organic total	Nitrogen, ammonia total (N)	Nitrogen ammonia organic total (N)
07/28/61 10/31/66 05/15/67 04/06/72 04/10/73	1430	2.1 1.2	14.0 5.0 0.0 0.0	115 124 95 162 151	7.6 7.5 7.1 7.8 7.6	2.3 2.7 5.1 2.0 3.0	46 43 33 64 62	56 53 40 78 75	10 10 0 6	0.14	 0.00	0.14
			Pho	os- Phos		ssolved o	onstitue	ents				

07/27/61 10/31/66 05/15/67 04/06/72 04/10/73	0.20 0.27 1.0 0.41	0.53	60 17 17 45 12 14 79 25 25		1.2 4.3 2.5 4.1 3.8	1.7 1.2 1.7 2.7 2.8	0.4 0.1 0.5 0.3 0.6	1.0 0.0 0.0 0.8 2.8	12 17 12 16 17				
		T				i ssol ved	constit	uents					
	Date	Fluoride (F)	Silica (SiO ₂)	Iron (µg/L) (Fe)	Iron (µg/L) (Fe)*	Manga- nese (µg/L) (Mn)	Manga- nese (µg/L) (Mn)*	Cadmium (µg/L) (Cd)	Copper (µg/L) (Cu)	Lead (µg/L) (Pb)	Zinc (µg/L) (Zn)	Solids, sum of consti- tuents	
	07/28/61 10/31/66 05/15/67 04/06/72	0.1 0.1 0.5 0.1	9.7 8.9 8.3	 50	30 1510 790	 10	30	==	 	 	 	75 77 64 99	
	04/10/73	0.1	9.6	30		20		0	6	2	10	101	

CONVERSION TABLE

SPECIFIC CONDUCTANCE, IN MICROMHOS PER CENTIMETER AT 25° CELSIUS

Figure 13. -- Relationship between specific conductance and

hardness under low-flow conditions at six surface-water sites

in the Potter and Little Rabbit Creek basins. (See table 3.)

To obtain

liters per second (L/s)

liters per second (L/s)

degrees Celsius (°C)

meter (m)

cubic feet per second (ft³/s) 28.32

gallons per minute (gal/min) 0.063

degrees Fahrenheit (°F) (°F-32)/1.8

foot (ft)

Table 5 1	Field water-qua	ality data f	or Little R	abbit Cro	eek at
A	Anchorage (nea	ar the Old	Seward F	lighway)	from
1	.979 to 1980.	[Site 7 sh	own on fig	ure 2. R	esults
i	n milligrams pe	r liter exce	pt as indica	ated.1	

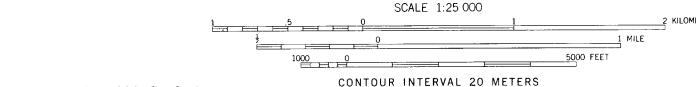
Date	Time	Stream- flow, instan- taneous (ft³/s)	Temper- ature (°C)	Specific con- ductance (µmhos)	pH (units)	Alka- linity (CaCO ₃)	Bicar- bonate (HCO ₃)	Oxygen, dis- solved	dis- solved (per- cent satur- ation)	form, fecal, 0.7 UM-MF (cols./
06/26/79	1500	16	7.0	95						
06/27/79	1400	31	7.0	93						
08/09/79	0930	6.2	9.0	130	7.2	45	55			
09/11/79	1430	2.7	8.0	140	6.8	54	66	11.9	100	
10/25/79	1430	3.9	2.5	130	6.8	48	. 59	13.2	100	*K2
						'				
11/28/79	1400	20	0.5	115	7.2	32	39	13.8	97	
01/04/80	1330	4.1	0.5	140	6.9	49	60	14.7	100	
02/11/80	1100	7.3	0.5	140	6.8	46	56	14.1	97	
03/26/80	1500	2.1	0.5	155	7.5	57	70	14.0		*K2
04/18/80	1500	8.1	3.0	145	7.5	48	58	13.2	100	
04/28/80	1330	9.2	5.0	125			77			
05/19/80	1245	16	6.5	110	7.4	33	40			
05/20/80	1530	16								*K11
05/29/80	1500	14	6.5	110	7.4	33	40	12.6	102	
05/30/80	1330	25	5.0	108						
06/18/80	1530	19	6.5	90	7.4	30	36			

STREAMFLOW, IN CUBIC FEET PER SECOND

Figure 14. -- Relationships of streamflow to specific conductance and

alkalinity at Little Rabbit Creek at Anchorage.

*K - non-ideal colony count



61°02′30′

Table 6. -- Regression analysis results: water-quality data from six sites

	on Little R	abbit and P	otter Creeks		
Independent variable	Dependent variable	Humber of observations (n)	Regression equation	Coefficient of determination (R ²)	Standard error of estimate (Sy:
Specific conductance (µmhos)	Bicarbonate (mg/L as HCO ₃)	17	y = -15.5 + 0.57 X	0.96	2.6
Specific conductance (µmhos)	Hardness (mg/L as CaCO ₃)	17	y = -11.3 + 0.56 X	0.95	2.9
Specific conductance (µmhos)	Calcium (mg/L as Ca²+)	17	y = -1.8 + 0.16 X	0.87	1.4
Specific conductance (µmhos)	Magnesium (mg/L as Mg ² +)	17	y = -1.7 + 0.04 X	0.63	0.7
Specific conductance (µmhos)	Sodium (mg/L as Na+)	17	y = -0.7 + 0.02 X	0.60	0,4
Specific conductance (µmhos)	Dissolved solids (mg/L residue at 180°C)	12	y = -9.1 + 0.66 X	0.73	8.0
Streamflow (ft³/s)	Specific conductance (junhos)	15	y = 146 - 2.0 X	0.72	11.0
Streamflow (ft³/s)	Alkalinity (mg/L as CaCO ₃)	11	y = 56 - 1.4 X	0,92	28.0

EXPLANATION OF TABLE 7 HEADINGS

Section and map number identify well locations using a scheme based on the township and range system of the U.S. Land Survey. All sections in the study area are in township 11 north (T. 11 N.), and either range 2 west (R. 2 W.) or R. 3 W. relative to the Seward meridian. Of the sections in the study area in R. 2 W. only section 6 has wells for which data are available: all other sections on the table are in T. 11 N., R. 3 W. Each well in table 7 has a number that corresponds to the site number in the appropriate section in figure 12. (See the text

Owner is the person or other entity responsible for the well. If ownership has changed, additional names may be available in Watstore files; only one owner is

Depth drilled indicates the maximum depth drilled. $\underline{\text{Depth of well}}$ is the depth of the lowest opening in the finished well; normally, the depth is that to the bottom of the casing or well screen.

Depth cased is the depth to the bottom of the solid casing.

Finish refers to the nature of the opening(s) that allows water to enter the well: $\overline{0} = \text{open}$ casing; X = open hole; S = screen; F = gravel pack with perforations; P = perforated or slotted; W = walled; Z = other.

Water level is the depth to water in a completed, non-pumping well. An F indicates the well is flowing, having a hydraulic head above the land surface; the elevation of this head above land surface may not have been measured. Next to the water level is shown the method used to determine it: E = estimated; G = pressure gage; T = electric tape; R = reported (usually by driller), method of

Date water level measured refers to the water level shown on the table; other measurements and dates may be stored in Watstore files and can be retrieved. Discharge is the reported rate of pumping or of natural flow of the well; an Faccompanying the numeral indicates the well is naturally flowing.

Pumping period is the length of time during which the well is pumped, at the discharge rate reported, to achieve the drawdown reported.

Drawdown is the distance (generally the maximum observed) from the static or

unstressed water level in the well to the level of water in the well during pumping

Date discharge measured is the date of the testing described in the preceding three columns. Principal aquifer describes the geologic nature of the aquifer, if known, that

Lithology of principal aquifer is a more detailed description (if available) of the structure and composition of the principal aquifer than given under "Principal

Depth to bedrock is the depth to the top of consolidated sediments or rock, as reported by the driller.

Table 7. -- Well data from the Potter Creek study area [See figure 12 for well locations.]

Towns	Range	Secti	Well number	Owner	drilled (ft)	of well (ft)	Depth cased	Finish	level (ft)	level measured	Discharge (gal/min)		Pumping period (hours)	Date discharge measured	Principal aquifer	Lithology of principal aquifer	Depth to bedrock (ft)
11N 11N 11N 11N 11N	2W 2W 2W 2W 2W	6 6 6 6	1 5 3 2 4	Clark, Cecil Wilcox, William Bredesen, William Nash, Don Gunnels, Bruce	30 56 17 100 190	30 56 17 100 190	53 	S 0 X	18 R 12.5 R 30 R	10/30/78 06/17/77 09/22/77	3 3 5	35 40	1.0	10/30/78 09/22/77 10/11/78	unconsol. unconsol.	gravel, cemented sand, gravel, some silt	 37 29
11N 11N 11N 11N 11N	3W 3W 3W 3W 3W	1 1 1 1	4 12 13 6	Unruh, Troy Moore, Eugene Root, William Willis, Tom Wilson, William	56 85 100 46 28	56 85 100 46 28	56 13 22 46	0 0 X 0	F 17 R 20 F 10+G	05/15/71 05/21/76 07/31/74 08/15/73 1957	5 3 3 20 50 F	15 		05/15/71 05/21/76 07/31/74 08/15/73 1957	unconsol. bedrock bedrock unconsol.	sand, gravel sand, gravel	5 10
11N 11N 11N	3W 3W 3W	1 1 1	9 2 15	Wojciechow, Linda Wilson, George Stephens, Shaw	125 38 50	125 38 50	60 38 50	X 0 0	1+R 16 16 R	03/31/75 1955 08/12/77	10 15	==	1.0	11/24/75	bedrock 		56
11N 11N	3W	1	15 8	Baker, Charles Goodrich, Craig	11 50	11 40	40	X O	10 R 1+R	09/04/79 04/04/75	 5	==	1.0	08/21/77 04/04/75	N.A. unconsol.	shallow test hole gravel, silty	==
11N 11N 11N 11N	3M 3M 3M	1 1 1	3 3 11 11	Wingerd, James Ruby, Earle J. Bair, Joseph Haygood, Mary	63 13 41 99	63 13 40 98	63 40 98	0 X 0	6 R 4 R 40 R	09/27/71 07/22/77 04/07/75 08/15/76	8 6 5	=======================================	1.0	09/27/71 04/07/75 08/15/76	unconsol. N.A. unconsol. unconsol.	sand, gravel shallow test hole gravel gravel	
11N 11N 11N	3M 3M	1 1 1	19 14 20	English, Wally Helbig, Rudi Cutler Engineer	12 108 18	12 108 18	108	Х О W	9 R F 7 R	03/28/78 06/25/76 12/10/76	4	==		06/25/76	N.A. unconsol. N.A.	shallow test hole sand, gravel shallow test hole	
11N 11N 11N	3W 3W	1 1 1	18 21 16	Strait, Dennis Rollins, Ron Tadda, Frank	70 127 55	70 127 55	126	0	36 R 120 R 50 E	08/15/77 06/79 06/09/76	20 5 5	==	==	8/15/77 06/79 06/09/76	bedrock 		18
11N 11N 11N 11N 11N	3W 3W 3W 3W	1 1 1 1	10 7 5 17 22	Kurtzman, Jack Keller, Howard Shuck, Curtis Scott, Thomas A. Ascott, John	57 54 50 112 158	55 50 50 112 158	55 50 112 72	0 0 S 0 X	3 R 1+R F 44 R	07/02/75 04/01/75 09/25/79	10 5 6 0.5	65	1.0 1.0 1.0	07/02/75 04/02/75 09/25/79 10/03/79	unconsol. unconsol. bedrock bedrock	gravel gravel 	 90 67
11N 11N 11N	3W 3W 3W	2 2 2	8 15 9	Sharp, Larry Rebischke, David Bass, Christin	200 43 84	200 43 84	38 43 62	X 0 X	15 R	12/02/72	1 8		0.5	12/02/72 03/16/77	bedrock unconsol.	sand, gravel, some till	33
11N 11N 11N	3M 3M	2 2 2	17 18 14	Cuzzort, Earl Slaymaker, Trent McConaha, Lewis H.	9 71 64	9 71 64	71 64	х 0 0	7 R 45 R 24 R	09/16/75 08/23/79 03/11/78	 8 18			08/23/79 03/11/78	N.A. unconsol.	shallow test hole sand, gravel	==
11N 11N 11N 11N	3W 3W 3W	2 2 2	14 2 1 16	McConaha, Lewis H. Pinard, Paul Sherburne, Leslie Zankie, Peter	8 35 15 20	8 35 15 20	35	X P F X	5 R	02/20/78	10	==	 	1958	N.A. 	shallow test hole	
11N 11N	3W 3W	2 2 2 2	19 19	Grimes, James Belanger, David D.	280 238	280 238	 56	 X	==	03/19/75	2 2 2		 1.0	08/25/78 10/02/78	N.A. bedrock bedrock	shallow test hole	22 48
11N 11N 11N 11N	3W 3W	2 2	10 5 4	Mackey, Bill Stevenson, Gary Miller, James A.	100 60 65	100 60 65	26 20 26	X X X	22 R 7	06/15/78	10 1 5	31 40	4.0	06/15/78 02/69 03/29/73	bedrock unconsol. unconsol.		24 20 26
11N 11N 11N 11N 11N	3W 3W 3W 3W	2 2 2 2	13 11 12 7 6	Bloomfield, Jerry Kosky, Robert Dortch, Robert Cartee, Terry Woll, George S.	117 275 318 294	117 275 318 294	5 18 34	X X X	20 R 10 R 38	11/28/75 05/14/79 07/27/76	11 2 3 1	 	1.0	11/28/75 09/27/75 05/14/79 07/27/76	bedrock bedrock bedrock bedrock	=======================================	1 24 15 31
11N 11N 11N 11N 11N	3W 3W 3W 3W	2 3 3 3	3 14 19 20 21	Bittlingmaier, K. Rebischke, Dave Berggren, John S. Berggren, John S. Berggren, John S.	101 19 373 373 533	101 19 373 373 533	 36	X X X X	55 R 14 R 1 R 9 R 14 R	1966 07/17/76 05/18/79 05/14/79 05/24/79	 5 5 11	 	 	 05/18/79 05/14/79 05/24/79	N.A. bedrock bedrock bedrock	shallow test hole	6 26 33 29
11N 11N 11N	3W 3W 3W	3 3	21 18 5	Berggren, John S. Berggren, John S. Payton, Bill	533 533 313	533 533 313	95 	X X	14 R 101 R	05/23/79 05/31/79	2 1 35		 	05/23/79 05/31/79 07/12/78	bedrock bedrock	 	21 93
11N 11N 11N	3W 3W	3 3	5 4 4	Winchester, Gerald Northern Homes Northern Homes	217 440 192	217 440 192	30 280 25	х 0 х	92 50 R 96 T	05/18/79 08/27/78 11/14/77	5 2 2	115	2.0 1.0	05/18/79 08/27/78	bedrock 		8
11N 11N 11N 11N	3W 3W 3W	3 3 3	7 7 16 6	Frenzel, George B. Frenzel, George Hudson, Henry Jungwirth, Tom	78 12 131 200	78 12 131 200	29 34	x x x	20 T 7 R 40 R 108 T	11/14/// 10/04/77 09/08/77 01/20/78	15 10 3	4	0.5 	11/14/77 10/04/77 01/20/78	bedrock bedrock N.A. bedrock bedrock	 shallow test hole 	26 41 32
11N 11N 11N 11N 11N	3W 3W 3W 3W	3 3 3 3	6 2 1 3 3	Hamlen, Steve Feiler, Geoff Bell, Bill Sloan, Jim Neithercoat, William	217 102 85 250 266	217 102 85 250 266	217 57 59 49 63	P X X X X	7 35 R 23 R 28 R 58 R	05/10/78 06/02/76 10/70 05/27/76 05/30/76	2 F 3 10 3			05/10/78 06/02/76 05/27/76 05/30/76	bedrock unconsol. bedrock bedrock bedrock	:: ::	38 55 59 45 60
11N 11N 11N 11N 11N	3W 3W 3W 3W 3W	3 3 3 3	17 10 12 11 15	Pisa, Steve Gibbons, Sandy Bieber, Craig Berggren, John P. B. & J. Company	250 180 132 310 15	250 180 132 310 15	21 40	X X X	15.5 R 8 T 100 R 12 R	06/22/78 06/22/78 06/22/78 07/14/78 06/02/75	2 3 5 5	109	2.0 23.0	06/22/79 06/22/78 06/22/78 07/14/78	bedrock bedrock bedrock	 	35 30 17 35
11N 11N 11N 11N	3M 3M 3M 3M	3 3 3	13 9 9	Bibeau, Armand A. Strickler, William R. P. B. & J. Company Stickler, George R.	83 60 16 60	83 58 16 60	82 58 60	0 0 X	51.5 R 15 T 11 R 15 T	06/02/75 06/07/79 06/08/78 12/23/75 08/08/77	7 5 10	18 33 10	1.0 2.0 1.0	06/07/79 06/08/78 08/06/77	N.A. unconsol. unconsol. N.A. unconsol.	shallow test hole sand, gravel sand, gravel shallow test hole sand, gravel	
11N 11N 11N	3W	4 4 4	3 4 1	Jelardin, Richard Mosher, Ron Mosher, Ron	350 250 330	350 250 330	19 250	х 0	8 R 40 E 50 E	04/12/75 07/02/78	3 0.6		==	04/12/75 08/74 07/02/78	bedrock bedrock		19 78
11N 11N 11N	3W 3W 3W	4 4 10	4 2 1	Gaard, Gary D. Johnson, R. Dalthrop, Roy	125 60 85	125 60 85	51 80	X S P	12 R 52 F	07/15/77 	5 9 5	103	1.0	07/15/77 1972 08/70	bedrock	 	40 80
11N 11N 11N 11N 11N	3W 3W 3W 3W 3W	10 10 10 10 10	6 6 3 3 7	Breazeale, Clint Bumgardner, James Prichard, James Pisa, Steve Dubie, Gerald	82 140 55 185 58	80 140 55 185 58	80 40 58	0 X P	49.5 130 R 21 R 	01/23/76 08/11/79 08/19/70 	12 10 6 3 10	30	 1.0	01/23/74 08/11/79 08/19/70 11/10/78 08/02/79	unconsol. bedrock unconsol.	sand gravel	81 121 40
11N 11N 11N 11N 11N	3W 3W 3W	10 10 10 10 10	4 4 2 5 5	Lynch, James Pisa, Steve Coulson, Dave Bumgardner, James Tuomi, Jack	60 180 55 110 205	60 180 55 110 205	60 14 110	0 X P	50 R 10	07/10/76 09/70 06/13/78	8 3 4 5 5	 40 	 	12/74 07/10/76 09/70 06/73	bedrock bedrock bedrock	: :: ::	80 0
11N 11N 11N 11N	3W 3W 3W	11 11 11 11	9 6 3	Senne, George Mahar, Bob Belanger, David Sasso, John	68 410 150 150	68 410 150 150	38 28	P X X	28 80 R 45 R	07/23/76 06/71 11/16/78	10 0.5 3 2	2		06/13/78 07/23/76 12/18/78 06/71 11/16/78	unconsol. bedrock bedrock	sand, gravel 	38 19 36 20
11N 11N 11N	3W 3W	11 11 11	1 2 8	Richardson, Kenneth Sizemore, Jim Engle, Doris	525 220 230	525 220 230	52	z 	54 22 R	05/29/73 09/04/76	0.6 5		 	05/22/73	bedrock	 	51
11N 11N 11N 11N	3W 3W 3W	11 11 11	4 4 7 7	Hayes, Sam Rhodes, James Ford, David Weeldreyer, Douglas	377 160 99	377 160 99	24 198	X P	155 T	09/19/78	0.3 2 8			05/24/73 09/19/78 08/08/78	bedrock bedrock	 	23 5 39
11N	3W 3W 3W	11 11 12 13	11 10 1	Weber, Sepp Weideman, Robert Paine, Luther Miller, John	305 253 94 125	305 253 94 125	305 252 38 77	P 0 X X	105 R 92.5 R 13.3 F	10/20/79 01/06/77 01/04/61 07/21/68	1 10 4 20 F	148		11/19/79 10/20/79 01/06/77 01/04/61 07/22/68	unconsol. bedrock unconsol. unconsol.	sand, gravel, hard sand, gravel 	61
11N 11N 11N	3W 3W 3W 3W	13 13 13 14 14	2 3 4 1 2	Granger, Bill Viewpoint Ventures #1 Viewpoint Vantures #3 Garrett, Jack Buckwalter, Francis	306 170 296 32 4 75	306 170 296 324 75	160 280 300 50	0 S X X	100 E 147 287 35 R	09/03/77 08/06/81 05/24/70 08/70	4 20 90 0.8 3	15 30 35	26	09/03/77 04/23/81 08/06/81 05/24/70 08/70	bedrock unconsol. unconsol. bedrock bedrock	sand, gravel gravelly sand 	139 157 295 300 50
11N 11N	3W 3W 3W	14 14 14 15	3 4 5 1	Viewpoint Ventures #2 Viewpoint Ventures #4 Viewpoint Ventures #5 Thompson, W. J.	280 320 518 100	280 320 518 100	277 300 518 23	0 X 0 X	28 R	 07/03/79	25 -3	 	 	 07/03/79	unconsol. N.A. N.A. bedrock	sand gravel shallow test hole shallow test hole 	277 17

EXPLANATION ● 1 Water well and number

6 Spring and number

FIGURE 12. -- WELL LOCATIONS

LOCATIONS OF WELLS AND GROUND-WATER QUALITY SAMPLING SITES

The locations of the 119 wells in the Potter Creek area for which information was on file in the U.S. Geological Survey's Watstore computer file system as of May 1980 are shown in figure 12. All these wells serve private residences. Also shown are the four wells from which samples were obtained for ground-

Well locations were plotted using township, range, section, and site number. Township, range, and section are a standard basis for locating areas on maps (Compton, 1962). To locate wells within sections, map numbers are assigned sequentially to wells as well logs are received and processed. Wells located very close together (within about 300 ft) may share a single map number. Thus, some points shown on figure 12 represent more than one well. Table 7 provides data on individual wells.

WELL DATA

Data from drillers' logs of the 119 wells in the Potter Creek area used in this report are given in table 7. The table only summarizes pertinent information and is not exhaustive. Only one entry of each data type is shown for each site. For example, although a well may have been test pumped on more than one occasion, data from only one such test appear in the table. The Kinds of data for which more than one entry may be on file are: owner, types of logs available, water level, date of water leve measurement, discharge, date of discharge measurement, drawdown, and pumping period. All available data can be retrieved from computer files if needed.

For additional information contact the U.S. Geological Survey, 1209 Orca Street, Anchorage, Alaska, 99501.

SUMMARY AND CONCLUSIONS Factors limiting residential and other development in the

Potter Creek area are chiefly: 1) water supply, 2) surface drainage conditions, and 3) disposal of wastes by onsite systems.

Hydrologic Cycle

• Precipitation in the Potter Creek area is roughly twice that measured in the main part of the Anchorage bowl. • Total streamflow in the Potter Creek study area is about 17

Water Quality

• Ground water is generally of potable quality, but it is

• Surface water is generally of potable quality; predominant ions are calcium and bicarbonate, and the water is soft to

• Wells were the sole source of domestic water in 1980. • Most wells in the study area obtain water from bedrock; the average well tapping bedrock is more than 200 ft deep and yields 4½ gal/min.

• Wells obtaining water from unconsolidated sediments are generally less than 100 ft deep and yield an average of 71

• Where well yields are less than 3 gal/min, a means of storing

domestic water. • A water supply adequate for domestic use can be obtained from wells throughout most of the Potter Creek area, so long as storage of water is provided where wells have low yields. Although small community water supplies may be obtainable, few wells could provide more than a domestic

supply of water. Drainage and Waste Disposal

• Wetlands and areas of shallow ground water occur in about 24 percent of the Potter Creek area; potential problems in such areas include seepage into excavations, unstable foundations and roadbeds, winter icings, and failure of

septic systems. • Septic systems may not operate safely where landslope exceeds 20 percent, where the permeability of surficial materials is very high or low, or where the water table or bedrock is within 15 ft of land surface. Suitability for septic systems may depend on the above factors in combina-

• Landslope exceeds 20 percent in more than half the study

• Bedrock occurs at the surface in about one third of the • Where maps indicate wetlands or shallow ground water moderate to steep slopes, near-surface bedrock, or surficial materials of low permeability, site-specific investigations

may be necessary to determine suitability for development.

HYDROGEOLOGY FOR LAND-USE PLANNING: THE POTTER CREEK AREA, ANCHORAGE, ALASKA

By Richard P. Emanuel and Derrill J. Cowing

at the reported discharge rate.